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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/662,372

09/16/2003

Hisashi Kobayashi

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9409

27182

7590

08/03/2006

PRAXAIR, INC.

LAW DEPARTMENT - M1 557

39 OLD RIDGEBURY ROAD

DANBURY, CT 06810-5113

EXAMINER

COCKS, JOSIAH C

ART UNIT

PAPER NUMBER

3749

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/662,372

Applicant(s)

KOBAYASHI ET AL.

Examiner

Josiah Cocks

Art Unit

3749

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Response to Amendment***

1. Receipt of applicant's amendment filed 5/18/2006 is acknowledged.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1-7, 9, 10-16, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,586,443 to Burge et al. ("Burge") in view of U.S. Patent No. 6,282,901 to Marin et al. ("Marin").

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Burge discloses in the specification and figures 1-21 an invention in the same field of endeavor as applicant's invention and similar to that described in applicant's claims 1-7, 9, 10-16, 18, and 20. In particular, Burge shows a combustion method that reduces the amount of NO<sub>x</sub> emitted including: providing a combustion device (10), and feeding primary air/oxidizing gas (through inlet 23) and fuel (63) into the device through a burner that comprises means for feeding secondary air (see inlet 24 and at least col. 16, lines 15-30) and tertiary air (see inlet 96 and at least col. 18, lines 9-41)) into the device. Burge notes that the oxidizing gas supplied to the combustion device may be air or pure oxygen (see col. 3, line 63) and that, dependent upon the type of fuel utilized, a nitrogen-rich stream may be introduced into the device as a carrier gas (see item 152, Fig. 13).

The examiner considers that either of the secondary or tertiary oxidizing gases (which as noted above may be pure oxygen) may be considered the oxygen-rich stream provided into the flame. Alternatively, Burge clearly teaches that "make-up" oxygen may be provided to the combustion device with a stream of air based on the specific nature of the fuel supplied (see col. 21, lines 3-7). This "make-up" oxygen may also be considered to be the oxygen-rich stream described in applicant's claims.

In regard to at least claim 10, the source of oxidizing gas (65) is properly considered to be from a source other than the burner.

Burge possibly does not disclose that the air supplied is specifically separated outside the combustion device into an oxygen-rich stream and a nitrogen-rich stream or that a portion of flue gas is fed with the nitrogen-rich stream.

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Marin teaches in Figures 1-4 a combustion method that is considered to be analogous art to both applicant's invention and Burge. In Marin, an air stream is separated into an oxygen-rich and nitrogen rich stream with the oxygen rich stream is feed with the fuel into a combustor flame and the entirety (100%) of a nitrogen rich stream is fed into a combustion device (see col. 4, lines 21-53). The nitrogen rich steam may be fed with a flue gas stream to the combustion device (see at least col. 8, lines 41-44).

In regard to the limitations that the air is separated into as gas stream "consisting of oxygen-rich gas" and a gas stream "consisting of nitrogen-rich gas" (e.g. claims 1 and 10) these recitations are considered present in the combination of Burge and Marin. As shown particularly in Figs. 13 and 14 of Burge, a nitrogen gas source (152) is shown feeding nitrogen gas to a combustor and an air source (159) (which may be pure oxygen, col. 3, line 63) is fed to the combustor. A separate fuel source (183) is fed to the combustor through valve (150). Each of these nitrogen gas and oxygen streams identified in Burge is considered to "consist" of oxygen-rich gas and nitrogen-rich gas as claimed by applicant. A person of ordinary skill in the art would understand these nitrogen and oxygen gas streams to be desirably generated through external separation of an air stream in the manner taught by Marin (see at least col. 4, lines 21-53).

Therefore, in regard to claims 1-7, 9, 10-16, 18, and 20, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate the air separation taught by Marin as this air separation process is recognized in the art as a means to produce separate nitrogen and oxygen rich stream which

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when fed to a combustion device aid in reducing undesirable gaseous emissions into the atmosphere (see Marin, col. 4, lines 9-14).

5. Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burge in view of Marin as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 4,257,763 to Reed ("Reed").

Marin in view of Burge teach all the limitations of claims 8 and 17 except that water is fed with the nitrogen-rich stream.

Reed teaches a low NO<sub>x</sub> burner and method of combustion using the burner that is considered to be analogous art to both applicant's invention and Burge. In Reed, liquid water (70) is supplied to mix with an air stream (see col. 4, lines 45-48).

Therefore, in regard to claims 8 and 17, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate adding liquid water to an air stream of a combustor as taught in Reed for the desirable purpose of providing NO<sub>x</sub> reduction when combusted (see Reed, col. 4, lines 48-60).

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burge in view of Marin as applied to claim 10 above, and further in view of U.S. Patent No. 5,809,910 to Svendsen ("Svendsen").

Burge in view of Marin teach all the limitations of claim 19 except possibly for injecting a reducing agent that reacts with NO<sub>x</sub> to form N<sub>2</sub> for NO<sub>x</sub> reduction.

Svendssen teaches a combustion method that is considered analogous art to both applicant's invention and Burge. In Svendssen, a reducing agent (3) is injected that functions to reduce NOx emissions from a combustion device (see at least col. 3, line 59, through col. 4, line 5).

Therefore, in regard to claim 19, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate injecting a reducing agent as taught in Svendssen to reduce the emission of undesirable compounds, such as NOx, during the combustion process (see col. 3, line 59, through col. 4, line 5).

7. Claim 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,586,443 to Burge et al. ("Burge") in view of U.S. Patent No. 4,257,763 to Reed ("Reed").

Burge discloses in the specification and figures 1-21 an invention in the same field of endeavor as applicant's invention and similar to that described in applicant's claim 21. In particular, Burge shows a combustion method that reduces the amount of NOx emitted including: providing a combustion device (10), and feeding primary air/oxidizing gas (through inlet 23) and fuel (63) into the device through a burner that comprises means for feeding secondary air (see inlet 24 and at least col. 16, lines 15-30) and tertiary air (see inlet 96 and at least col. 18, lines 9-41)) into the device. Burge notes that the oxidizing gas supplied to the combustion device may be air or pure oxygen (see col. 3, line 63) and that, dependent upon the type of fuel utilized, a nitrogen-rich stream may be introduced into the device as a carrier gas (see item 152, Fig. 13).

Burge does not disclose that water is fed with the nitrogen-rich stream.

Reed teaches a low NOx burner and method of combustion using the burner that is considered to be analogous art to both applicant's invention and Burge. In Reed, liquid water (70) is supplied to mix with an air stream (see col. 4, lines 45-48).

Therefore, in regard to claims 8 and 17, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate adding liquid water to an air stream of a combustor as taught in Reed for the desirable purpose of providing NOx reduction when combusted (see Reed, col. 4, lines 48-60).

### ***Response to Arguments***

8. Applicant's arguments filed 5/18/2006 have been fully considered but they are not persuasive.

Applicant argues that the limitations that the gas streams consisting of oxygen-rich and nitrogen-rich gas distinguishes over the gas streams of Burge. The examiner does not agree. As noted above, Burge clearly provides separate nitrogen gas and oxygen lines feeding the combustor (see at least Fig. 13 of Burge). As taught by Marin, a person of ordinary skill in the art would understand these oxygen and nitrogen streams to be formed by an air separation unit. Applicant has asserted that the basis for the amendments to the claims made 5/18/2006 arise from common understand in the technical field that air separation units produce stream that are entirely gaseous (see response, p. 8). While the examiner considers that the gas streams of Burge consist of oxygen and nitrogen rich gas as claimed by applicant, Marin clearly teaches an air separation unit of the same type identified by applicant. Accordingly, by applicant's own



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admission, the gaseous streams produced in Marin are entirely gaseous. Therefore, the combination of Burge and Marin teaches providing oxygen and nitrogen streams that are entirely gaseous.

Further, while Burge does disclose that pulverized fuel is also supplied to the combustor, this is not regarded to render the separate gaseous streams taught by Burge and Marin to no longer consist of their respective gases. The examiner notes that applicant's own invention includes delivering the nitrogen and oxygen streams together with a fuel (including pulverized fuel, see applicant's specification paragraph [0025]). Further, as shown particularly in applicant's Figs. 1 and 2, at least the oxygen stream is supplied in conjunction with the fuel (note that fuel passage 4 and oxygen passage 5 feed into a mixing area prior to entering the combustion chamber 2). Therefore, the nitrogen and oxygen gas streams taught in Burge and Marin are considered to meet the corresponding nitrogen and oxygen gas streams of applicant's claims.

Accordingly, applicant's claims are not considered to patentably distinguish applicant's invention over the prior art of record.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Josiah Cocks whose telephone number is (571) 272-4874. The examiner can normally be reached on weekdays from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg, can be reached at (571) 272-4828. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jcc  
July 31, 2006

  
JOSIAH COCKS  
PRIMARY EXAMINER  
ART UNIT 3749